General Notes.

GEOLOGY AND PALEONTOLOGY.

Mud Avalanches in the Mustagh Mountains.—During a recent exploration in the Mustagh Mountains in India, Mr. W. M. Conway noticed the accumulation in the valleys, of debris consisting of stones as often rounded as angular, embedded in mud. In the Gilgit valley this accumulation reaches a depth of 1000 feet or more. The author claims that the work of filling up the valleys, not only in the Mustagh Mountains but all the deeply filled valleys characteristic of the Central Asian plateau, has been done by mud avalanches, and he gives the following interesting account of one of which he was an eye witness.

"We were just approaching the mouth of a deep, narrow nala that crossed our path when we heard a noise as of continuous thunder, and beheld a vast black wave advancing down it at a rapid pace. Some accumulation of water had got loose high aloft, and the flood was bringing the hill down with it. When we reached the edge of the nala the main mass of the stuff had gone by and only a thick, black stream of mud was rushing swiftly past. This became by degrees more liquid until it was no longer mud but black water. We waited for some time till the waters subsided. At length Harkbir found a way across the torrent by leaping from stone to stone. We had begun to follow him when Karbir, who was looking up the nala, shouted to us to come back, which we did with the nimblest feet. We were not more than out of the ditch before another huge mud avalanche came sweeping down. It was a horrid sight. The weight of the mud carried huge masses of rock down the gully, rolling them over and over like so many pebbles, and they in turn dammed back the muddy torrent and kept it moving slowly with accumulating volume. Each of the big rocks that formed the vanguard of this avalanche weighed many tons; the largest were about 10 feet cubes. The stuff that followed them filled the nala to a width of about 40 feet and a depth of about 15 feet. The thing moved down at about the rate of five miles an hour. When the front of the avalanche was gone, and the mass of stuff became shallower, the mixture was about half mud, half rocks, and flowed faster. Now and again a bigger rock than the average would bar the way; the mud

would pile up behind it and presently sweep it on. Looking up the nala we could see the sides of it constantly falling in and their ruins carried down. Three times did the nala yield a frightful offspring of this kind, and each time it found a new exit into the main river below, and entirely changed the shape of the fan. The third avalanche was the largest of all, and fortunately left a causeway of stones, reaching almost across the nala, at our very feet. Some big fall must have presently taken place higher up and dammed back the waters, for the stream ran almost dry and we were enabled to cross the gully without difficulty.

"Assuming that one of the avalanches we saw travelled at the rate of only 7 miles an hour=200 yards a minute, and took only 7 minutes to pass any point, it would be 1400 yards long. Call its average width 8 yards, and average depth 2 yards, it would consist of over 10000 cubic yards of stuff. Suppose three-fourths of this to have been water, you get 2500 cubic yards of débris discharged by one of these avalanches, and we saw three come down a single gully, where others had fallen before we arrived and others fell after we left. 15000 cubic yards is a low estimate for the fall of that one day down that single and relatively small gully. One gully of this sort to every mile of valley is a minimum computation. It is easy to see then what a powerful element mud avalanches must be in determining the physical features of this region of the earth." (Geog. Journ., Oct., 1893.)

Cladodont Sharks of the Cleveland Shale.—The fossil sharks recently discovered in the Cleveland shale are of especial interest and importance because they show definitely the form of structure of these early Elasmobranchs. Professor E. W. Claypole has made them the subject of a paper in the American Geologist, May, 1893. The material now at hand represents four species of *Cladodus*, and two of *Monocladodus*. These genera are closely allied, but the absence of lateral denticles, in the opinion of the author, marks a generic difference. *M. clarkii* is distinguished by the fact that the teeth stand in pairs, one close behind the other. *M. pinnatus* is represented by a single specimen which is unique from the great strength of the ventral fins, whence comes its specific name. Both of these species are figured, together with *Cladodus sinuatus*, *C. clarkii*, and *C. rivi-petrosi*. Professor Claypole gives also an amended description of Newberry's *C. replerii*. The genus *Monocladodus* is very near to, if not identical with *Styptobasis* Cope.

The Neocene Sierra Nevada.—The observations recorded by Mr. Waldemar Lindgren in a paper on Two Neocene rivers of California appear to prove conclusively (1) that the Sierra Nevada in Neocene times, in the watersheds of the Yuba and American rivers, formed a mountain range as distinct as that of to-day, and that its first summit in general, coincided with the corresponding modern divide; (2) that the slope of this range has been considerably increased since the time when the Neocene ante-volcanic rivers flowed over its surface; (3) that the surface of the Sierra Nevada has been deformed during this uplift, and that the most noticeable deformation has been caused by a subsidence of the portion adjoining the great valley relatively to the middle part of the range. (Bull. Geol. Soc. Am., June, 1893.)

Geological News. Paleozoic.—In Notes on some Devonian plants from New York and Pennsylvania, Mr. Penhallow describes a new species, which he refers to the genera *Haliserites*, *Dictyotites* (gen. nov.) and *Psilophyton*. From the data afforded by these plants the author gives a fresh definition of the characters which distinguish *Haliserites* and reintroduces the *Dictyotites*, once used by Brongniart, but which had been abandoned by authors. (Proceeds. U. S. Natl. Mas., Vol. XVI, 1893.)

Mr. C. S. Prosser calls the attention of geologists to lists of fossils from eastern New York and Pennsylvania, with statements of their stratigraphic position, which show that the fossiliferous zone underlying the Oneonta sandstone in Chenango and Otsego counties, New York, is not the top of the Hamilton but belongs to the Portage stage. (Proceeds. U. S. Natl. Mus., Vol. XVI, 1893.)

A new fossil sponge has been found in the shales of the Quebec group at Little Metis, Canada. It was probably of sac-like form and about 14 inches in diameter. Its walls consist of rhombic meshes made up of delicate spicules loosely twisted together and apparently branching at the angles. This sponge is the largest and most complex yet found in formations of so great age. Dr. Hinde proposes to place it in the new genus, *Palæssaccus*. (Bull. Geol. Soc. Am., Sept., 1893.)

Mesozoic.—In a contribution to the invertebrate paleontology of the Texas Cretaceous Mr. F. W. Cragin describes 151 species, of which 1 Cœlenterate, 17 Echinoderms, and 86 Molluscs are either new species or varieties. This collection belongs to the Museum of the Texas Geol. Surv. and comprises the Cretaceous fossils accumulated during the field work of four years. (Fourth Ann. Rept., Texas Geol. Surv. for 1892.)

The recent figures and descriptions of European Pterodactyls published by Professor Seeley have satisfied Mr. S. W. Williston that the generic characters of Pteranodon Marsh are included in those of Ornithostoma Seeley, and he accordingly states that the Kansas species hitherto placed in the genus Pteranodon may now be known under the earlier generic name of Ornithostoma, and the family as the Ornithostomatidæ. (Kansas Univ. Quart., Oct., 1893). In this same publication Mr. Williston gives a life size restoration of *Clidastes velox* Marsh based upon an unusually complete specimen of this Mosasaur from western Kansas.

Two new species of invertebrates *Ostrea munsonii* and *Radiolites davidsonii*, from the Caprina limestone of Texas are figured and described by Mr. R. T. Hill. In a preface to the descriptions the author states that this formation is of great interest from the fact that in it we have all the species of the aberrant Chamidæ and Rudistes known to occur in the United States, with the exception of Coralliochama of California and the *Radiolites austinensis*, forms common in the Upper Cretaceous of Alabama, Texas and Colorado. (Proceeds. Biol. Soc. Wash., 1893.)

Mr. W. M. Fontaine's examination of the collection of fossil plants from the Trinity division of the Comanche series of Texas results as follows: Equisetum, 1 sp. nov.; Ferns 1; Cycads 7, of which 1 is new; Conifers 10, 4 new, uncertain 4, of which 3 are probably new. The author considers the plant bearing portion of the Trinity to be somewhat older than the basal Potomac strata, but the difference in age is not great. (Proceeds. U. S. Natl. Mus., 1893.)

A small collection of fossil plants from the Kootanie group of Great Falls, Montana, has been examined by Mr. Fontaine. The specimens show nothing but ferns, conifers and one Equisetum. The conifers are badly preserved. Of the 9 ferns 5 are new, descriptions of which are given in the Proceeds. U. S. Natl. Mus., Vol. XV with plates. Cycads are rare in the Great Falls flora, none being found in the collection examined. The one figured in the paper mentioned under the name *Zamites montanensis*, was obtained from this field by Mr. Williams, and is described by Mr. Fontaine from a drawing. This collection confirms Dr. Newberry's conclusions that the Potomac group, the Great Falls group, the Kootanie group of Canada, and the Kome group of Greenland are all of the same general age.

Cenozoic.—In studying the Finger Lakes of Western New York, Mr. A. P. Brigham concludes that the basins are a composite

resultant of valley erosion, glacial scoop, and drift barriers, with perhaps a slight element of orography. The deepening of the lakes to the southward is the result of the narrowing of the ice between contracting valley walls which increases the vertical pressure and hence intensifies the erosion. (Bull. Am. Geog. Soc., 1893.)

In a review of the knowledge of the paleolithic man in North America M. Boule remarks that the recent work of Mr. Holmes does not invalidate the discoveries of paleolithic objects in America, and particularly those of Dr. Abbott, which M. Boule considers to be "true finds" in every sense of the word.

It is suggested by Mr. F. W. Hutton that the Ostriches of Africa and South America have orginated in the Northern Hemisphere possibly as swimming birds—and the Gastornithidæ, which have relations with the Anatidæ, may be their ancestors. (Proceeds. Austral. Assoc. Adv. Sci., 1892.)

According to Dr. Du Riche Preller, the Engadine Lakes owe their origin to the subsidence or dislocation of the old divide of the Inn and Bargalia systems, and the consequent deflections to the south of the original Inn sources. From a powerful Alpine torrent the Inn was reduced to a small stream without sufficient volume or fall to carry away the deposits brought down by lateral torrents. These deposits accumulated and thus the lakes were formed by the weakened river being banked up at various points. (Geol. Mag., Oct., 1893.)

From the evidence of marine fossil shells in the Bowlder Clay on the Bay of Fundy just west of Saint John harbor, Dr. Robert Chalmers concludes that the height of the land on this part of the Bay during the Glacial period must have been 100 to 200 feet lower than at the present day, relatively to the sea. Also since the striæ on the rocks underneath the bowlder-clay indicate several ice movements varying in direction from S. 2° W. to S. 65° E. the formation of the lower bowlder-clay cannot all be due to one body of ice. (Bull. Geol. Soc. Am., 1893.)